

Remarks

This is in response to the Office Action mailed on August 13, 2003. Claim 1 has been amended, support for the amendment being found, for example, at page 6, lines 32-34 of the present application. Claim 23 has been added, incorporating subject matter from claims 1 and 7. In addition, new claims 24-38 that depend from claim 23 are based on claims 8-22. No new matter has been added. Reconsideration and allowance of all pending claims are respectfully requested.

I. Claims Rejections - 35 U.S.C. § 102

Claims 1-5 were rejected under 35 U.S.C. § 102(b) as being anticipated by Sekine et al., U.S. Patent Published Application No. 2001/0026659 A1. This rejection is respectfully traversed, and the correctness of the rejection, including the status of Sekine as prior art to the present application, is not conceded.

Claim 1 is directed to an optical device. Claim 1 recites, among other limitations, a first optical member separating an incident light of wavelength λ into a TE wave and a TM wave, wherein an angle defined by a first reciprocal lattice vector α_1 and a second reciprocal lattice vector α_2 of the first optical member at the wavelength λ is not larger than 90° . Claim 1 further recites that a size of the wave number of the TE wave and the wave number of the TM wave alternate in the direction of the first reciprocal lattice vector α_1 and in the direction of the second reciprocal lattice vector α_2 .

An optical device configured as recited by claim 1 is advantageous because the device produces an effect such that, in every direction, the direction perpendicular to the dispersion surface (i.e., the group velocity direction) is significantly different for the TE wave and the TM wave. A large separation angle can thereby be attained. Application, page 6, lines 34-37.

Sekine discloses a device including a photonic crystal 1 having an input waveguide 4 allowing light to enter the photonic crystal 1 perpendicularly, an output waveguide 5 for generating TE-polarized light that is angled with respect to photonic crystal 1, and an output waveguide 6 for generating TM-polarized light that is reversely angled with respect to the output waveguide 5. See Sekine, Figure 1.

However, Sekine fails to disclose or suggest a device configured such that a size of the wave number of the TE wave and the wave number of the TM wave alternate in the direction of

the first reciprocal lattice vector α_1 and in the direction of the second reciprocal lattice vector α_2 , as recited by claim 1.

For example, in Sekine, when incident light is directed in the direction of a reciprocal lattice vector, the light propagates on the same optical axis as the incident light both inside and outside the photonic crystal 1, so that TE-polarized light and TM-polarized light are divided for the output waveguide 5 for TE-polarized light and the output waveguide 6 for TM-polarized light at the coupling portion. However, when incident light in Sekine is displaced from the direction of the reciprocal vector, after being deflected in a separation direction inside the photonic crystal 1, the TE-polarized light and the TM-polarized light propagate in parallel with the incident light from positions displaced from the optical axis of the incident light (i.e., for the TE-polarized light, the position displaced toward the output waveguide 5 for TE-polarized light; for the TM-polarized light, the position is displaced toward the output waveguide 6 for TM-polarized light). In addition, the TE-polarized light and the TM-polarized light are divided for the output waveguide 5 for TE-polarized light and the output waveguide 6 for TM-polarized light according to the respective distances displaced from the optical axis of the incident light. At this point, the TE-polarized light and the TM-polarized light are essentially divided for the output waveguide 5 (for TE-polarized light) and the output waveguide 6 (for TM-polarized light), respectively.

In contrast to the configuration disclosed in Sekine, claim 1 recites that the optical device is configured so that a size of the wave number of the TE wave and the wave number of the TM wave alternate in the direction of the first reciprocal lattice vector α_1 and in the direction of the second reciprocal lattice vector α_2 . Thus, in this configuration as recited by claim 1, after being deflected in a separation direction inside the photonic crystal, the TE wave and the TM wave propagate in parallel with the incident light from positions, on an outgoing end portion of the photonic crystal, that are displaced from the optical axis of the incident of light (i.e., for the TE wave, the position where the output waveguide for the TE wave is coupled; for the TM wave, the position where the output waveguide for the TM wave is coupled) and thus propagate individually through respective waveguides that are coupled in the same direction as their proration direction. As noted above, this configuration recited by claim 1 allows the TE wave and TM wave to be separated more precisely.

Consequently, Sekine fails to disclose such a configuration as recited by claim 1. Therefore, reconsideration and allowance of claim 1 and claims 2-5 that depend therefrom are respectfully requested.

II. Claim Rejections - 35 U.S.C. § 103

Claim 6 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Sekine. This rejection is respectfully traversed, and the correctness of the rejection is not conceded.

However, claim 6 depends from claim 1 and should therefore be allowable for at least the same reasons as those provided above with respect to claim 1. Reconsideration and allowance of claim 6 are respectfully requested.

III. Allowable Subject Matter

Claims 7-22 were noted as being allowable if rewritten in independent form. Applicant appreciates the Examiner's assistance in identifying allowable subject matter. All claims should now be in condition for allowance.

IV. New Claims 23-38

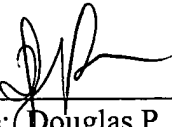
Claim 23 incorporates subject matter from claim 1 and allowable claim 7. Claims 24-38 depend from claim 23. Therefore, claims 23-38 should be in condition for allowance. Favorable consideration is requested.

V. **Conclusion**

Favorable reconsideration in the form of a Notice of Allowance is respectfully requested.
Please contact the undersigned attorney with any questions regarding this application.

Respectfully submitted,
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